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DISPLAY DEVICE WITH FLEXIBLE DISPLAY**TECHNICAL FIELD**

The present invention generally relates to display devices with a flexible display. The present invention specifically relates to display devices with a flexible display, a supporting frame and a device body.

BACKGROUND

Mobile display devices, such as mobile phones or e-readers, which make use of flexible displays have in their storage position a compact state, for instance for transportation, pre-viewing or phone calls. In the open position they are in a reading/viewing state with the flexible display in extended position supported by a support frame.

A display device that makes use of these two states will have a specific shape that is different from mobile products that do not use flexible displays. This specific shape can make the user interaction with the device mechanically instable or can make it difficult to handle by a user.

A number of product concepts have been developed for devices with flexible displays. The most important concepts are the 'wrap', the 'book' and the 'roll'. An example of a 'wrap' concept is shown in WO 2008/054206 A2, of a 'roll' concept in WO 2006/038171 A1.

One of the problems in user interaction with a mobile e-reader in the use of a prior art "wrap"-type e-reader, as shown in FIG. 1, is shown in FIG. 2. When such a device in the open position is put on a table, it is unstable and will rock or wiggle when a user is interacting with the device, e.g. touching buttons on the device to switch pages. The same problem will occur when the user holds the device in hand while pushing the buttons or touching the display in case it is a touch sensitive display.

In a 'book' type e-reader as shown in FIG. 3 for example provided with a dual hinge variant, the bridge between the book halves can be very big, and therefore stick out below the book halves in open position. This can result in the book wobbling when interacted with, while on a table.

On the other hand a problem as shown in FIG. 4 can also occur when the bridge between the book halves is very thin. Depending on the desired shape of the product if the user presses on the central part of the open book device the book halves can flip upwards.

A special form of the book device is the so-called asymmetric book as shown in FIG. 5. In this case one half of the book is thicker than the other. This has some advantages such as weight and volume distribution and touch support. However the wiggle problem is of course even larger in this concept.

Another type of e-reader with a flexible display is a "roll-type" e-reader as shown in FIG. 6. When such a device is put on a table or held by hand, it can also be unstable, similar to the wrap-type device.

It is an object of the invention to improve the physical user interaction with a mobile display device provided with a flexible display.

The present invention is directed toward overcoming one or more of the problems discussed above.

SUMMARY OF THE EMBODIMENTS

According to the invention the display device comprises a device body with upper and lower body sides and has at least one surface support part for supporting the body on a surface,

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a continuous flexible display, a support frame configured to support at least a part of the flexible display, at least a portion of the support frame being connected with the device body and being movable with respect to the device body between a closed configuration for fixing the flexible display in a storage position and an open configuration for fixing the flexible display in an open position, and having at least one surface support part for supporting the support frame on a surface, wherein in the open configuration the at least one surface support part of the support frame and the surface support parts of the lower body side are positioned in one plane, enabling a supporting of the surface support parts of the support frame and of the device body on a surface for a stable user interaction with the device in the open position of the display.

In accordance with the invention, by positioning in the open position in one common plane the surface support parts of the device body and the support frame that supports the flexible display, the freedom of movement of the device is limited during user interaction with the display device.

By doing this the device is better supported when placed on a surface such as a table. The user can interact with buttons on the device body, without creating unwanted movements of the flexible display device.

According to one embodiment of the invention in the open configuration the flexible display is positioned in a plane located under an obtuse angle with respect to the lower body side. Preferably the device body comprises at the lower body side an extending portion, the lower end of which is configured as surface support part.

In accordance with this aspect of the invention, by positioning in the open position the device body and the support frame under an obtuse angle the device is stably supported on a surface.

According to a "wrap" embodiment of the invention the support frame comprises hinge portions to enable in the closed configuration a wrapped storage position of the flexible display, one of the hinge portions being hingeably connected with the device body, the hingeable connection with the body being located at some distance above a plane through the lower body side of the device body.

According to another "wrap" embodiment of the invention the support frame comprises hinge portions to enable in the closed configuration a wrapped storage position of the flexible display, one of the hinge portions being hingeably connected with the device body, the hingeable connection being located near the lateral end of the extending portion of the device body comprising the surface support part.

According to a "book" embodiment of the invention the support frame comprises two portions, each configured to support a part of the display, the device body at its upper body side being a first portion of the support frame, a second portion of the support frame being hingeably connected with the first portion of the support frame, wherein the hingeable connection in the support frame in the open configuration is being moved upwardly in the direction of the display, enabling a stable positioning of the device in the open position of the display. This offers a special advantage for substantially symmetrical "book" concepts.

According to an asymmetrical "book" embodiment of the invention the support frame comprises two portions, each configured to support a part of the display, the device body at its upper body side being a first portion of the support frame, a second portion of the support frame being hingeably connected with the first portion of the support frame, in the open configuration the maximum height of the device being largest at the device body side, wherein in the open configuration of the support frame the flexible display is positioned in a plane